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Veröffentlichungsversion / Published Version

Zeitschriftenartikel / journal article

### Empfohlene Zitierung / Suggested Citation:

Schaupp, J., & Geiger, S. (2022). Mindfulness as a path to fostering time affluence and well-being. *Applied Psychology: Health and Well-Being*, 14(1), 196-214. <https://doi.org/10.1111/aphw.12298>

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# Mindfulness as a path to fostering time affluence and well-being

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## Funding information

Bundesministerium für Bildung und Forschung, Grant/Award Number: O1UT1708A

## Abstract

Given that time pressure is a widespread and straining phenomenon in modern societies, strategies to alleviate it are increasingly required. Employing a quasi-experimental longitudinal design with an active control group, the present study examined whether practicing mindfulness may attenuate time pressure and lead to more time affluence. Corroborating and extending findings on positive effects of mindfulness practice, the presented longitudinal study suggests that compared with a physically exercising control group, participation in a mindfulness-based stress reduction (MBSR) program leads to increases in time affluence and subjective well-being. Further, a mediation analysis revealed that the effect of increased mindfulness on subjective well-being is partially mediated through this increase in time affluence. As the first longitudinal study suggesting a change of time affluence as a result of participation in an MBSR program, this work enriches the research on mindfulness and time affluence and provides important impetus for future research. Moreover, this research provides an explanation for the well-established effects of mindfulness practice on well-being: increased subjective time affluence plays a mediating role. The paper underlines the importance of considering time affluence as an element of

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well-being in mindfulness and general psychology research alike.

#### KEYWORDS

mindfulness, subjective well-being, time affluence, time pressure, time wealth

## INTRODUCTION

Time pressure is a widespread phenomenon and omnipresent term in many Western societies. Evidence from various countries like Austria (Statistik Austria, 2011), Australia (Craig & Mullan, 2009), Norway (Eriksen, 2001), and the United Kingdom (Southerton, 2003) shows that individuals are negatively affected by feeling hurried and suffering from time pressure. Projections from a representative survey in Germany show that the number of people that felt pressed for time slightly increased over the last 5 years from approximately 25 to 26 million, representing 36.8 per cent of the adult population (Statista, 2019). Potential detrimental effects of time pressure have been researched in diverse fields including mental health and emotional well-being (Gärling et al., 2014; Roxburgh, 2004). Zuzanek (2004), for example, presents empirical findings, showing that high subjective time pressure is associated with a poor self-rated health status, a low quality of life, and low subjective well-being. A positive relationship between time affluence on the other hand and subjective well-being was found in one of the few psychological studies concerning time affluence (Kasser & Sheldon, 2009). Accordingly, many individuals desire less time pressure and more time affluence (Garhammer, 2002a, 2002b; Rinderspacher, 2002).

Given the widespread prevalence of time scarcity and its negative effects on human well-being, Garhammer (2002a) has emphasized the role of time affluence as a substantial dimension of well-being and quality of life in developed Western societies, complementing material affluence. Increasing awareness about time pressure and the need to reduce it has led to calls for interventions promoting a slower pace of life and increasing time affluence (Szollos, 2009). The present paper explores a potential candidate for such an intervention, namely, the practice of mindfulness, and presents supporting evidence from a controlled, longitudinal study. Although in focusing on mindfulness practice, a more individual strategy to increase time affluence is investigated, the authors acknowledge that time pressure is a structural phenomenon that involves social, political, and economic dimensions.

### Time affluence and time wealth

The concept of time wealth originated in the demand for an alternative concept of societal welfare, complementing a mere material comprehension of welfare by a qualitative temporal dimension (Rinderspacher, 2012). Although authors from economy (Reisch, 2001, 2015) have introduced terms like “time prosperity” or “wealth in time” to complement “wealth in goods,” other authors as Kasser and Sheldon (2009) have used the expression “time affluence” for having enough time for duties and desires as well as not feeling pressed for time. Although all

mentioned terms refer to a core understanding of time wealth as having sufficient time without feeling hurried or pressed for time, different components of the concept beyond this core understanding are highlighted by different authors. Rinderspacher (2012) and Reisch (2001), for example, stress the importance of sovereignty regarding one's time use and synchronization with the time rhythms of important others. Following Garhammer (2002a), von Jorck et al. (2019) add the aspect of what they call sufficiently stable horizons of expectations, deriving a fivefold definition of time wealth. These five dimensions foremost comprise a sufficient amount *free time* devoid of any duties, affording an adequate *tempo* of everyday activities, while allowing a *plannable, sovereign synchronization* of different temporal demands. The different aspects of time wealth described in the literature reveal that we deal with a complex and multifaceted construct, expressing in different ways. In the current paper, we suppose that having enough time and not feeling hurried or under time pressure constitute a basic component of time wealth, which we refer to as "time affluence" according to Kasser and Sheldon (2009), whose operationalization we use in our study. We recognize that the complexity of time wealth exceeds the meaning of this basic component and contains additional aspects like time autonomy and a chronometric dimension of the right timing. Thus, time affluence, understood here as having enough time and not feeling hurried, is comprehended to constitute a necessary, but not sufficient condition for a fully realized wealth in time.

## Mindfulness as a way to promote time affluence

Although empirical evidence is still scarce, recent research suggests that a path to less time pressure and more time affluence could consist in learning and practicing mindfulness. Mindfulness refers to consciously paying attention to present experiences in a nonjudgmental manner (Bishop, 2004; Kabat-Zinn, 2003) while maintaining an open, accepting, benevolent attitude (Grossman, 2010). According to various authors (Bishop, 2004), the two aspects of presence and acceptance are core dimensions of mindfulness. Regarding presence, mindfulness refers to focusing attention and awareness on the present moment, comprising attentive perception of body sensations, emotional reactions, cognitions, and sensory experiences (Baer et al., 2006). The second aspect refers to an attitude of openness and acceptance towards the present experiences. This is understood as the ability to experience present sensations and thoughts in a nonjudgmental and nonelaborative way (Bishop, 2004). We focus on mindfulness as a dispositional trait of people (Rau & Williams, 2016), which should potentially be enhanced by engaging in mindful meditation practice (Visted et al., 2015).

Kasser and Sheldon (2009) were the first to present a positive association between dispositional mindfulness and time affluence, proposing a mediated relationship from time affluence to well-being via mindfulness. Unfortunately, the size of bivariate correlations between mindfulness and time affluence is not reported and a disputed measurement of mindfulness has been employed, that at best might serve as an approximation of mindfulness disposition in people (for a discussion on the instrument, see Brown et al., 2011; Grossman, 2011). As time affluence in the conceptualization of Kasser and Sheldon (2009) is a subjective evaluation of one's temporal situation, we suppose it is more likely that changes in trait mindfulness lead to changes of this evaluation than vice versa. In addition, Wittmann et al. (2015) presented supporting evidence from a cross-sectional study, evidencing that meditation practitioners reported less time pressure than controls without meditation experience. Further, their study showed that mindfulness is associated with a subjective change in time perception, especially with a perceived

slowing down of time (Wittmann et al., 2015), which may be a mechanism underlying a potential effect of mindfulness on time affluence.

## Time affluence and well-being

Although mindfulness has only rarely been linked to time affluence, evidence is accumulating that time pressure in private and work life is negatively linked to subjective well-being and mental health issues (Roxburgh, 2004; Zuzanek, 2004). Subjective well-being is the degree to which an individual believes his or her life to go well (Diener et al., 2018). Gärling and colleagues (Gärling et al., 2014, 2016), for example, found negative relationships between time pressure and emotional well-being, whereas other authors (Garhammer, 2004; Schor, 2002) assume negative implications of time poverty on overall satisfaction with life. Complementarily to negative effects of time pressure, Kasser and Sheldon (2009) evidence a positive relationship between time affluence and subjective well-being across four studies. The positive association has been corroborated with managerial samples in Turkey and Egypt (Burke et al., 2009; Burke & El-Kot, 2009).

In previous research concerning associations between time affluence and well-being, mostly affective and cognitive aspects of well-being have been investigated, concordant with the conceptualization of Busseri and Sedava (2011). Other researchers emphasize a eudemonic aspect of subjective well-being, reflecting an individual's sense of purpose and engagement (Huppert & So, 2013). The Organisation for Economic Co-operation and Development (OECD) (2013) conceptualizes subjective well-being as spanning all three elements: life evaluation (cognitive aspect), a sense of meaning in life (eudemonic aspect), and emotional well-being (affective aspect). In the present study, we use the broad OECD module, because we are interested in time affluence's role in an overarching, socially relevant outcome. The module is part of such a socially relevant outcome, the Better Life Index, which aims to establish itself as a serious alternative to mere economic indices of progress.

## Aims of the study

Altogether, the reported evidence proposes a potential explanation for the mechanisms underlying the well-established positive effects of mindfulness practice on subjective well-being. Numerous studies have corroborated that mindfulness practice has positive effects on human well-being. There are intervention studies for psychological well-being (Brown & Ryan, 2003; Hanley et al., 2015; Shapiro et al., 2008), distress and quality of life (Grossman et al., 2010; Nyklíček & Kuijpers, 2008), and general health benefits (Grossman et al., 2004). Taken together, evidence of positive relationships between mindfulness and time affluence on the one hand, and between time affluence and subjective well-being on the other hand, suggests that the subjective experience of time, in the form of less time pressure or enhanced time affluence, might mediate the positive effects of mindfulness on subjective well-being.

The reported studies by Kasser and Sheldon (2009) and Wittmann and Lehnhoff (2005) are cross-sectional in nature, precluding conclusions on the effectiveness of mindfulness practice for the promotion of time affluence. Additionally, there are reservations about the measurements used to assess mindfulness in one of the studies (the Mindful Attention Awareness Scale [MAAS]; see above). Instead of solely focusing on cross-sectional evidence for dispositional

mindfulness, the current study employs a longitudinal design and examines the effects of participation in a mindfulness intervention (mindfulness-based stress reduction [MBSR], Kabat-Zinn, 2003) on mindfulness, perceived time affluence, and subjective well-being, compared with an active control group (CG). To discern if potential effects of mindfulness interventions are indeed based on changes in self-reported mindfulness instead of other features of the training, the current study examines whether participation in an MBSR program, compared with a non-mindfulness-based CG, leads to an increase in self-reported mindfulness (Hypothesis 1). In this regard, we aim to replicate findings on increased self-reported mindfulness through mindfulness interventions. In addition, we propose that an MBSR course can promote perceived time affluence (Hypothesis 2). Further, we intend to replicate research evidencing positive effects of MBSR courses on subjective well-being, assuming that participation in an MBSR course leads to an increase in subjective well-being (Hypothesis 3). Last, we compute a mediation model to test if the effect of increased mindfulness on subjective well-being is mediated by changes in time affluence (Hypothesis 4).

## METHODS

### Participants

Data collection took place from April to June 2018. A two-group pre–post design was used. Participants of the MBSR program and the CG were recruited via contacting the course instructors. The initial letter contained information about the approximate procedure as well as limited information regarding the purpose of the study and the plea for instructors to ask their course attendees to participate in the study. Initially,  $n = 73$  MBSR teachers were contacted via email; 24 teachers agreed to participate and were contacted via phone 1 week later. MBSR teachers informed the participants about the study and forwarded an email, containing a letter of invitation and a link to the online questionnaire at the beginning of the courses ( $t1$ ) as well as at the end of the program ( $t2$ ). In the CG, data were likewise collected at commencement of the courses ( $t1$ ) and 8 weeks after ( $t2$ ). No payment for participation was available, but two massage vouchers amounting to €50 each were raffled anonymously among all participants. The sample consisted of 150 participants (intervention group [IG],  $n = 62$ ; CG,  $n = 88$ ) who fully completed the questionnaire at  $t1$ . At the second point of measurement, 106 complete datasets were collected. Ten datasets of the second point of measurement could not be matched to the datasets of the first point of measurement, due to deficient identification codes. The remaining sample consisted of 96 participants representing a dropout rate of 36 per cent between  $t1$  and  $t2$ .

### Procedure

The study employed a longitudinal, quasi-experimental design with an active CG. As participants of preexistent courses were evaluated, they could not be randomly assigned to the IG or CG. The MBSR program comprises eight 2.5-h weekly group sessions and a mindfulness day (Kabat-Zinn, 2013). The program includes meditation practices like body scan meditation, Hatha yoga, sitting meditation, audio-guided home practice, short presentations, and exchange about day-to-day experiences. The CG was included to control for nonspecific treatment effects (e.g. an additional weekly appointment through the course). It consisted of students and staff

participating in various college sports courses at a German University, as well as individuals participating in sport courses of various tertiary education centers in Germany. Inclusion criteria for the courses serving as CG were (a) a minimum duration of 8 weeks; (b) start between April 16 and June 4, 2018; and (c) a moderate, mere physical training. The courses comprised pilates, back fitness, and aqua fitness. The study was conducted online through the software package *SoSci Survey* (Version 3.1.06-i by *SoSci Survey GmbH*, [soscisurvey.de](http://soscisurvey.de)). The study was conducted in accordance with the ethical guidelines for online studies of the German Society for Online Research (Deutsche Gesellschaft für Online Forschung [DGOF], 2007). Ethical approval was not required as per local legislation. Informed consent was obtained in digital form on the first page of the survey from all participants and anonymity of participants was guaranteed.

## Measures

### Mindfulness

Mindfulness was assessed using the short version of the Freiburg Mindfulness Inventory (FMI) (Walach et al., 2006). The FMI consists of 14 items reflecting a two-factor structure with a presence and an acceptance facet. Items (e.g. “I am open to the experience of the present moment”) were rated on a 4-point Likert scale (1 = *rarely* to 4 = *almost always*). The scale exhibited good reliability in the current study ( $t1: \omega = .87$ ;  $t2: \omega = .76$ ).

### Time affluence

Time affluence was assessed using the eight time dimension items of the Material and Time Affluence Scale (MATAS; English version by Kasser & Sheldon, 2009). Items (e.g. “I have had enough time to do the things that are important to me”) were rated on a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*). The scale was translated from English to German by Moser and Neubert (2018) and used in present tense. The time dimension of the scale showed a good internal consistency in the current sample ( $t1: \omega = .90$ ;  $t2: \omega = .90$ ).

### Subjective well-being

Well-being was assessed using the German version of the Core question module on subjective well-being by the OECD (2013). The module encompasses general life satisfaction, eudemonic sense of life, and three affective items. It is a five-item instrument, and items are rated on an 11-point rating scale ranging from 0 (*not at all*) to 10 (*completely*). The scale displayed a high internal consistency ( $t1: \omega = .87$ ;  $t2: \omega = .89$ ).

## Data analysis

All analyses were performed using SPSS 26.1 (IBM Corp., 2010). All significance tests were conducted two sided with a significance level of  $\alpha = .05$ .

## Data preparation and assumptions

Outcome variables were checked for outliers and extreme values prior to conducting analyses. One case was excluded due to extreme values ( $n = 95$ ). For a description of the exclusion process, see the supporting information. Assumptions for analysis of variance as well as for multiple regression were examined (Eid et al., 2017). The results are shown in the supporting information. All assumptions were accounted for.

## Statistical analysis

To test Hypotheses 1–3, group differences in changes over time in the three main variables were evaluated via a two-factorial multivariate analysis of variance (MANOVA) with repeated measurement (*condition*  $\times$  *time*) for all variables. Corrected Cohen's  $d$  effect sizes ( $d_{\text{corr}}$ ) were calculated based on the differences of effects between groups, as suggested by Klauer (2001). Statistical power calculation with G\*Power (Faul et al., 2007) for MANOVA showed that 109 participants were required to identify statistical differences between the groups at an average effect size of  $f(V) = .35$ ,  $p = .05$ , and power of 0.90 and 83 participants at an average effect size of  $f(V) = .40$ . To test Hypothesis 4, a mediation analysis based on the change values was conducted using the PROCESS macro (Version 2.16) for SPSS (Hayes, 2013). Significance of the regression coefficients was determined via 5000 bootstrapped resamples on a 95 per cent confidence interval (CI). Regarding the required sample size for computing mediation analysis, Fritz and MacKinnon (2007) give an orientation on the required sample size, depending on the size of the  $\alpha$  and  $\beta$  path. When using bias-corrected bootstrapping, 54 participants are required for a power of 80 per cent in a simple mediation model with a large  $\alpha$  path and a medium  $\beta$  path. Internal consistency of scales at both measurement points was computed with the reliability function of the semTools package (Jorgensen et al., 2020) executed in R Version 0.5-3.

## RESULTS

### Sample characteristics in both conditions

Mean age at  $t_1$  was 37.3 years ( $SD = 13.6$ ), and 86.2 per cent were females. The sample reported an average number of 0.40 ( $SD = 0.85$ ) children. The average time of gainful employment was 27.5 h ( $SD = 16.1$ ) per week (see Table 1 for more demographic data).

There were no differences between the IG and CG regarding gender ( $\chi^2(1) = 0.01$ ,  $p = .921$ ) and previous experience with mindfulness practice at the beginning of the courses ( $\chi^2(1) = 1.689$ ,  $p = .194$ ). To compare main occupation between the groups, the category “studying” was tested against a mixed category of other main types of occupation. In the mindfulness group, less people stated studying as their main occupation ( $\chi^2(1) = 19.6$ ,  $p < .001$ ), and participants were older on average ( $t(92) = 3.91$ ,  $p < .001$ ). Nevertheless, neither hours of gainful employment per week of those working ( $n = 83$ ) differed between groups ( $t(81) = 0.301$ ,  $p = .764$ ) nor did average number of children in the household ( $t(92) = 1.53$ ,  $p < .129$ ). Regarding central variables, the IG reported less mindfulness ( $t(92) = 5.074$ ,  $p < .001$ ), less time affluence ( $t(92) = 3.778$ ,  $p < .001$ ), and lower well-being ( $t(92) = 3.186$ ,  $p = .002$ ) at the outset of the



TABLE 1 Demographics in total and for each condition

	Total ( <i>n</i> = 94)		IG ( <i>n</i> = 35)		CG ( <i>n</i> = 59)		Group differences <i>t</i> ( <i>p</i> )
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Age	37.3	13.6	43.9	11.4	33.3	13.4	3.91(<.001)
Number of children in household	0.40	0.85	0.57	0.82	0.31	0.82	1.53(.129)
	(n = 83)		(n = 33)		(n = 50)		
Gainful employment (h/week) <sup>a</sup>	27.5	16.1	26.8	15.1	27.9	16.8	0.301(.764)
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	$\chi^2$ ( <i>p</i> )
Female	81	86.2	30	85.7	51	86.4	0.01(.921)
Regular occupation							
Studying	35	37.2	3	8.6	32	54.0	19.6(<.001) <sup>b</sup>
Employed (full-time)	31	33.0	14	40.0	17	28.8	
Employed (part-time)	17	18.1	12	34.3	5	8.5	
Other	11	11.8	6	16.2	5	8.5	
Highest level of education							
College or university	50	52.6	24	68.6	26	44	5.3(.021) <sup>c</sup>
Apprenticeship	6	6.3	3	8.6	3	5.1	
University entrance diploma	30	31.9	6	17.1	24	40.7	
Junior high/secondary	8	8.4	2	5.7	6	10.2	

Abbreviations: CG, control group; IG, intervention group; M, mean; SD, standard deviation.

<sup>a</sup>This question was not mandatory, only 83 data points were available.

<sup>b</sup>Category studying tested against other main types of occupation.

<sup>c</sup>Category college or university tested against other types of highest education.

course. Furthermore, it was tested if individuals who had dropped out at *t*<sub>2</sub> differed from completers regarding central variables. The dropouts did not differ significantly at *t*<sub>1</sub> in terms of mindfulness ( $t(146) = 0.572, p = .568$ ), well-being ( $t(146) = 0.558, p = .578$ ), and time affluence ( $t(146) = 0.1118, p = .265$ ).

The descriptive statistics for mindfulness, time affluence, and well-being in the CG and mindfulness group at both measurement points in time are presented in Table 2.

## Direct effects on mindfulness (Hypothesis 1)

A two-factorial MANOVA for all three dependent variables revealed a main effect of *time* ( $F(1, 92) = 96.37, p < .001, \eta_p^2 = .521$ ) and of *condition* ( $F(1, 92) = 4.37, p = .039, \eta_p^2 = .045$ ) for mindfulness. A significant interaction effect between *time* and *condition* ( $F(1, 92) = 63.67, p < .001, \eta_p^2 = .409$ ) indicated that increases in mindfulness were stronger for the IG (for an illustration, see Figure 1). The corrected effect size for intervention studies was  $d_{\text{corr}} = 1.38$ .

TABLE 2 Descriptive statistics for main variables as a function of condition and time

	Mindfulness group ( $n = 35$ )			Control group ( $n = 59$ )		
	M ( <i>SD</i> ) $t_1$	M ( <i>SD</i> ) $t_2$	$t(p)^a$	M ( <i>SD</i> ) $t_1$	M ( <i>SD</i> ) $t_2$	$t(p)^b$
Mindfulness	2.16 (0.38)	2.81 (0.35)	-8.93(<.001)	2.62 (0.45)	2.69 (0.43)	-1.86(.069)
Time affluence	2.49 (0.80)	3.29 (0.76)	-6.27(<.001)	3.12 (0.78)	2.97 (0.78)	1.85(.069)
Well-being	5.35 (1.43)	6.76 (1.39)	-6.91(<.001)	6.59 (2.01)	6.51 (1.86)	0.454(.651)

Abbreviations: M, mean;  $n$ , sample size; *SD*, standard deviation.

<sup>a</sup>Difference in mindfulness group between  $t_1$  and  $t_2$ .

<sup>b</sup>Difference in control group between  $t_1$  and  $t_2$ .

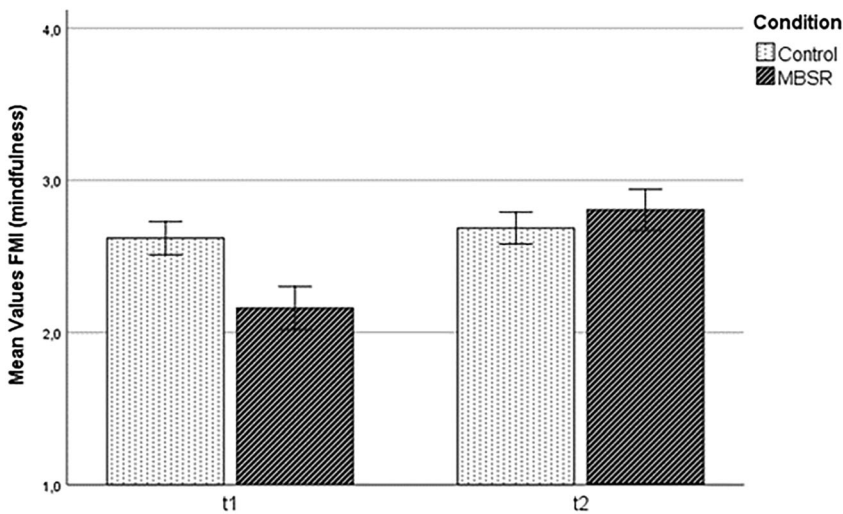


FIGURE 1 Intervention effect on mindfulness. Error bars denote the 95 % confidence interval. FMI, Freiburg Mindfulness Inventory; MBSR, mindfulness-based stress reduction

## Direct effects on time affluence (Hypothesis 2)

The MANOVA revealed a main effect for *time* ( $F(1, 92) = 19.75, p < .001, \eta_p^2 = .177$ ) and no main effect of *condition* ( $F(1, 92) = 1.14, p = .289, \eta_p^2 = .012$ ) for time affluence. A significant interaction effect between *time* and *condition* ( $F(1, 92) = 42.89, p < .001, \eta_p^2 = .318$ ) showed that increases in time affluence were stronger for the IG (see Figure 2). The corrected effect size for intervention studies was  $d_{\text{corr}} = 1.21$ .

## Direct effects on subjective well-being (Hypothesis 3)

The MANOVA revealed a main effect for *time* ( $F(1, 92) = 22.44, p < .001, \eta_p^2 = .196$ ) and no main effect of *condition* ( $F(1, 92) = 1.98, p = .162, \eta_p^2 = .021$ ) for well-being. A significant interaction effect between *time* and *condition* ( $F(1, 92) = 28.26, p < .001, \eta_p^2 = .235$ ) showed that

increases in well-being were stronger for the IG (see Figure 3). The corrected effect size for intervention studies was  $d_{\text{corr}} = 0.83$ .

### Effect of time separated for groups

The MANOVA revealed a significant main effect of time for mindfulness, time affluence, and well-being. When examining the groups separately, mindfulness scores did not differ significantly between  $t1$  and  $t2$  in the CG ( $t(58) = -1.86, p = .069$ , Cohen's  $d = 0.241$ ), neither did

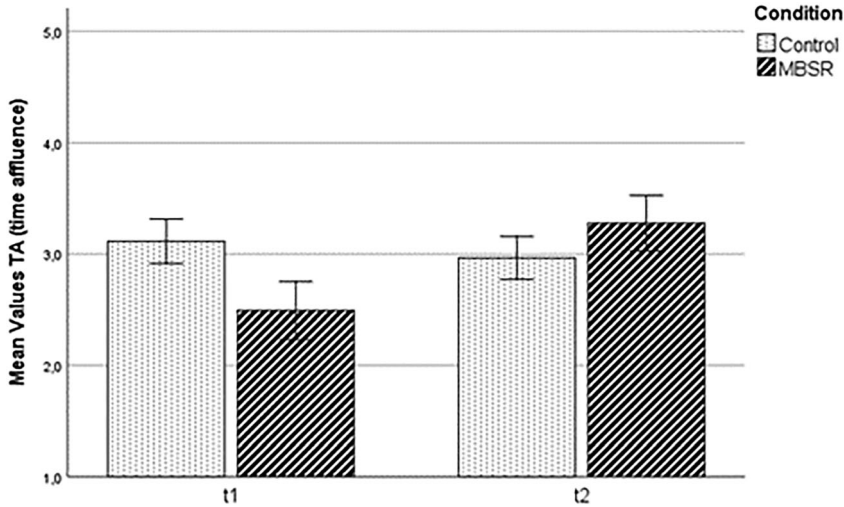


FIGURE 2 Intervention effect on time affluence. Error bars denote the 95 % confidence interval. MBSR, mindfulness-based stress reduction

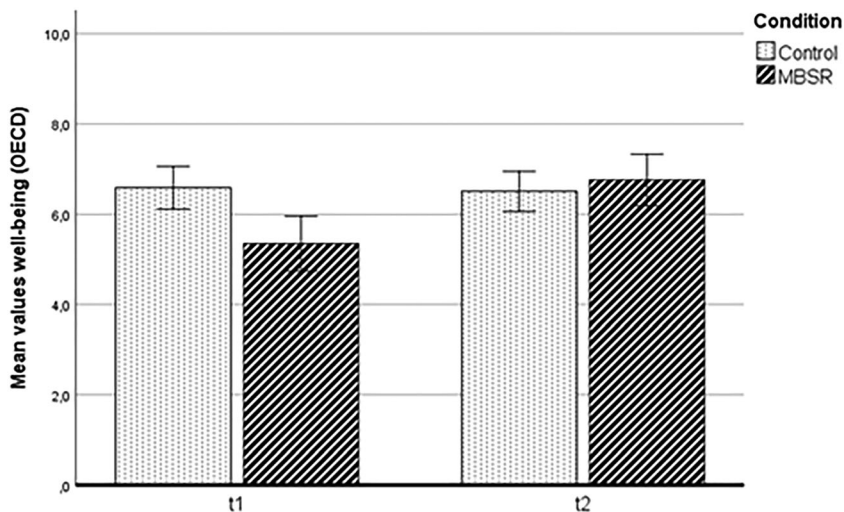
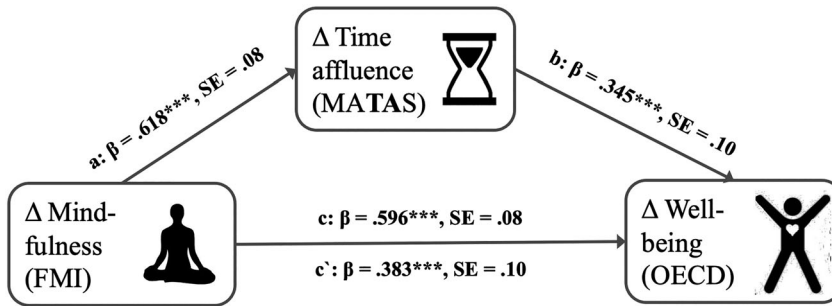


FIGURE 3 Intervention effect on well-being. Error bars denote the 95 per cent confidence interval. MBSR, mindfulness-based stress reduction; OECD, Organisation for Economic Co-operation and Development



**FIGURE 4** Mediation model based on delta values. Beta coefficients are standardised \* $p < .05$ , \*\* $p < .01$ , and \*\*\* $p < .001$ . Indirect effect = .213, 95 per cent CI [.091, .364]. FMI, Freiburg Mindfulness Inventory; MATAS, Material and Time Affluence Scale; OECD, Organisation for Economic Co-operation and Development

time affluence ( $t(58) = 1.85$ ,  $p = .069$ , Cohen's  $d = 0.241$ ) and well-being ( $t(58) = 0.454$ ,  $p = .651$ , Cohen's  $d = 0.059$ ). In the treatment group (TG), mindfulness scores differed significantly from  $t1$  to  $t2$  ( $t(34) = -8.93$ ,  $p < .001$ , Cohen's  $d = 1.51$ ). Likewise, time affluence ( $t(34) = -6.27$ ,  $p < .001$ , Cohen's  $d = 1.06$ ) and well-being ( $t(34) = -6.91$ ,  $p < .001$ , Cohen's  $d = 1.17$ ) differed significantly between  $t1$  and  $t2$  in the TG.

## Adjusted group differences

As the mindfulness group and CG differed significantly regarding baseline values on the three main outcome variables and age, we additionally tested the effects of these baseline group differences at  $t1$  as well as age in a multivariate covariance analysis (MANCOVA). Results are shown in the supporting information. The adjusted group differences between CG and TG in the post-mindfulness, post-well-being, and post-time affluence scores were significant. Age was a significant covariate for well-being at  $t2$ .

## Mediation analysis (Hypothesis 4)

To assess Hypothesis 4, a mediation analysis was performed. All standardised regression coefficients are shown in Figure 4. Results showed a significant indirect effect of mindfulness on well-being via time affluence,  $a * b = .213$ , 95 per cent CI [.091, .364]. This corresponds to a 35.7 per cent of the total effect of  $c = .595$  and expresses a partial mediation.

In addition to the mediation model outlined above, alternative mediation models assuming a different temporal succession were also feasible (e.g. mindfulness > well-being > time affluence, indirect effect  $a * b = .197$ , 95 per cent CI [.069, .332]).

## DISCUSSION

This study investigated potential effects of mindfulness practice on self-reported mindfulness, time affluence, and subjective well-being. Compared with the non-mindfulness-based CG,

participation in the MBSR course showed a large effect ( $d_{\text{corr}} = 1.38$ ) on self-reported mindfulness. The current study replicates positive evidence of increased self-reported mindfulness following mindfulness interventions (e.g. Shapiro et al., 2008) and shows that when compared with an active CG, participation in an MBSR course leads to an increase in self-reported mindfulness. The effect detected in the current study outruns the majority of effects reported in a recent meta-analysis on the effects of mindfulness-based interventions including retreats on self-reported mindfulness described by Visted et al. (2015), who report a mean effect size of  $g = 0.66$ , indicating a medium-to-large effect size, following Cohen (1988). Differences in effect sizes could stem from various sources, from a comparably low baseline at the outset, the type of interventions evaluated (ours was an 8-week standard length), or the scales' sensitivity to detect changes (mean effects size for evaluations using the FMI was  $g = 0.57$  in the meta-analysis).

We were further interested in the effects of the mindfulness intervention on time affluence and subjective well-being. Our study evidenced large effects on both variables (time affluence:  $d_{\text{corr}} = 1.21$ ; well-being:  $d_{\text{corr}} = 0.78$ ). We found a significant main effect of time for time affluence, well-being, and mindfulness across both groups. When inspecting the effects of time separately for the groups, time affluence, well-being, and mindfulness only differed significantly in the IG between  $t_1$  and  $t_2$ , but not in the CG. This reveals that the significant main effects of time for mindfulness, time affluence, and well-being result from the strong change in the TG from  $t_1$  to  $t_2$ , regarding these variables. The additional covariance analysis, including baseline values at  $t_1$  as a covariate, showed that the adjusted group differences between CG and TG in the post-mindfulness, post-well-being, and post-time affluence scores remained significant. This corroborates the robustness of our results even when taking the differing baseline values into account. Although the positive effects of the mindfulness intervention on well-being replicate a large body of findings demonstrating increases in well-being through MBSR courses, the effects on time affluence are a novelty. We are unaware of any research that has prospectively investigated effects of mindfulness meditation practice on time affluence.

The results of this first prospective study show that even relatively short mindfulness interventions such as the standard 8-week MBSR courses can contribute to an increase in perceived time affluence. The current findings are consistent with the study by Wittmann et al. (2015) who compared the judgment of passage of time as well as judgments of duration estimates between experienced mindfulness meditators and matched controls with no prior experience. Experienced meditators reported less time pressure, more time dilation, and a slower passage of time in the present. Further, they judged the past week and past month to have passed more slowly than the CG (Wittmann et al., 2015). This study suggests that mindfulness alters an individual's time perception through a perceived slowing down of time. In a study by Droit-Volet and Heros (2017), no differences in the judgment of passage of time or duration judgment were found between subjects with mindfulness meditation experience and a CG with no prior experience. However, mindfulness scores were associated with a slower passage of time during the last week (Droit-Volet & Heros, 2017). Wittmann et al. (2015) explain the prolonged retrospective time intervals in experienced meditators through their enhanced present moment sensory awareness. In retrospective time judgment, the duration judgment relies on memory processes. Because individuals with mindfulness experience have a stronger awareness of sensory events, more contextual changes are stored in memory, which results in the impression of longer durations and a subjectively slower passage of time (Block & Zakay, 1997; Wittmann et al., 2015; Wittmann & Schmidt, 2014). Findings of an earlier study by Sauer et al. (2012) point into a similar direction, showing that experienced mindfulness meditators could hold the perspective of an ambiguous Necker cube longer than subjects without meditation experience. Given this

represents the subjective duration of the present moment, as assumed in the study, the findings indicate that the subjective now can be longer for meditators. This again may promote a subjective feeling of time affluence. Thus, if mindfulness leads to a subjectively longer duration and a subjectively slower passage of time, the effect of mindfulness on time affluence could be mediated by this mechanism. Future research should separately test a subjectively slower passage of time, as well as a prolonged subjective duration of the present moment as mediating mechanisms for the effect of mindfulness on time affluence.

A prolonged duration of the current moment might be related to an individual's present time perspective. An approach for measuring time perspective was developed by Shipp et al. (2009) with the Temporal Focus Scale. Temporal focus describes the extent to which individuals usually direct their attention on present, future, or past events (Shipp et al., 2009). In a study by Hafenbrack et al. (2013), mindfulness meditation shifted the temporal focus away from the future and past and increased the awareness of the present moment. The results of Hafenbrack et al. (2013) on increased present focus were replicated in a German study, showing that mindfulness is associated with present temporal focus, but not with past or future temporal focus (Geiger et al., 2018). Earlier research has shown lower well-being for past-focused individuals and past focus is related to negative affect (Rush & Grouzet, 2012; Shipp et al., 2009). Present focus on the contrary is linked to higher well-being (Drake et al., 2008; Rush & Grouzet, 2012; Shipp et al., 2009). Rush and Grouzet (2012) assume that present focus is positively related to well-being, because well-being is experienced in the present moment and a present focus enables people to appreciate life.

Besides the mentioned changes in subjective time perception and time perspective, mindfulness practice may result in objective changes in time use. Thus, a mindfulness course may lead participants to objectively carry out less activities or to take more time to perform activities. Future research should discern whether increased mindfulness of MBSR participants alters their subjective perception of time at the same level of activity, or if mindfulness rather leads subjects to carry out less activities in their daily life and take more time for activities, thus if an objective difference in handling time plays a more decisive role.

It could be argued that the effect of mindfulness on time affluence observed in this study was not due to the effect of the meditation practice itself but rather to the fact that participants in the meditation group took time out of their usual daily schedule to participate in a new activity for themselves. However, participants in the CG also had a weekly appointment for their courses. Thus, objectively, all participants in our study had less free time at their disposal for the duration of the intervention, if at least, the hours of the weekly course duration. Nevertheless, they felt less hurried at the end of the course.

Furthermore, we explored if the increase of time affluence would mediate the effects of increased mindfulness on promoting subjective well-being. Findings indicated a significant indirect effect of mindfulness on well-being via time affluence, partially mediating the direct effect. This significant indirect effect corroborates findings from previous studies showing positive associations between time affluence and well-being (Gärling et al., 2014; Kasser & Sheldon, 2009). How time affluence would lead to enhanced well-being might be explained with assumptions from self-determination theory (Ryan et al., 2000; Ryan & Deci, 2017). Following self-determination theory, the basic psychological needs for relatedness, competence, and autonomy have to be satisfied to experience mental health and well-being. Personal well-being is a function of the satisfaction of basic psychological needs (Reis et al., 2000). Need frustration on the other hand is linked to reduced well-being (Chen et al., 2015; Heissel et al., 2018; Ryan & Deci, 2017). It can be assumed that when time affluence is higher,

individuals have more possibilities to engage in behaviors, which express and satisfy their needs. Results by Kasser and Sheldon (2009) support this assumption and show that the effect of time affluence on well-being is partially mediated by satisfaction of psychological needs. Thus, time affluence can enable people to spend more time with activities directed at their momentary psychological needs. Satisfied autonomy needs may thus be particularly important for explaining the effect of time affluence on well-being, enabling people to select activities that match their momentary needs.

Nevertheless, in addition to the mediation model outlines above, alternative mediation models assuming a different temporal succession are also feasible. In Kasser and Sheldon's (2009) mediation model, time affluence at the outset allows a more mindful way to be in the world, leading to enhanced well-being. Another alternative temporal sequence is that mindfulness might enhance time affluence by increasing well-being as reported in the results. Based on the data obtained by this study, it cannot be established that the mediation model proposed in our paper is superior to possible competing models that can likewise be extracted from our data. However, in light of all the evidence given for a theoretical point of view that time affluence leads to increased well-being, we argue that this causal sequence is more plausible than presuming the reversed mechanism. Therefore, we propose that a mindful awareness of the current moment is what drives the subjective perception of time affluence, leading to enhanced well-being consecutively.

To sum up, the present study provides evidence that the practice of mindfulness could be a promising way to promote time affluence, leading to increased well-being in turn. However, it seems important to understand time pressure not primarily as a personal problem that is individually created and to be solved with the help of mindfulness practice. This might simply lead to the cultivation of what Rosa (2005) calls "islands of deceleration" while neglecting the social, political, and economic dimensions of the structural phenomenon of increasing time pressure. As a psychological study, we give empirically founded arguments to seek such structural changes.

## Strengths and limitations

The present study extended upon previous studies concerning associations between mindfulness and time affluence by using a longitudinal design and an active CG. As the first longitudinal study evaluating effects of mindfulness-based interventions on time affluence, this work enriches research on time affluence and, in addition to uncovering large effects, provides important impetus for future research. At the same time, the present study has several limitations.

First, the study design was quasi-experimental, which limits its internal validity. Individuals were not randomly assigned to the groups, and there were systematic differences in the baseline values of mindfulness, time affluence, and well-being. As empirical evidence relates lower baseline values to stronger effects of mindfulness interventions (Geiger et al., 2019), this might have inflated the reported intervention effects and the true effects in a randomized design would likely have turned out smaller. Nevertheless, the mediation analysis was based on delta values from  $t_1$  and  $t_2$  and thus for the mediation model the different baseline values are being controlled for. Future studies with randomly assignment to the TG or CG are needed to ensure the findings reported here.

Restrictions also arise from the selection of courses for the control condition. Ideally, the control condition should have been identical to the MBSR course in all aspects besides content. However, the CG consisted mostly of participants attending college sports courses, thus differing in

other aspects, for example, age or course duration (some of the sports courses were shorter than the 2.5 h). Additionally, age emerged as a significant covariate for well-being at *t*<sub>2</sub>, revealing that the effect of the mindfulness intervention on well-being is partially due to the older age of the IG. Moreover, the assumption of temporal precedence of changes in mindfulness prior to changes in time affluence and in well-being cannot be assured based on the current study design. Replications with larger samples based on longitudinal data with multiple successive measurement points to demonstrate temporal precedence of the changes in mindfulness are needed.

Finally, we only used self-report assessment tools, which have been criticized particularly concerning the assessment of mindfulness. Psychological research has mostly assessed mindfulness using self-report assessment, but their limitations have been critically discussed in terms of suitable criteria or reference (Belzer et al., 2013; Grossman, 2011; Sauer et al., 2013). For the FMI Short Version, it has been shown that comprehension of some of the items is dependent on prior mindfulness experience (Belzer et al., 2013). Sauer et al. (2013) name assessment by others, language-based (e.g. Collins et al., 2009) and grounded theory approaches (e.g. Abba et al., 2008), as alternatives for assessing mindfulness via psychometric questionnaires. However, application of these approaches is still scarce, and according to Sauer et al. (2013), “such methods are still not finely tuned enough to provide a valid diagnostic tool on an individual basis” (p. 13). Due to economic reasons, this study used a psychometric questionnaire to assess mindfulness. Future research should examine effects of mindfulness interventions on time affluence and associations between mindfulness, time affluence, and well-being using an optimized longitudinal design as well as alternatives for assessing mindfulness via psychometric questionnaires.

## CONCLUSIONS

Despite the discussed limitations, the findings support positive effects of mindfulness courses on time affluence and provide an explanation for one mechanism driving the effect of increased mindfulness on improved subjective well-being: increased time affluence can be a factor. Given these findings as well as evidence of previous studies indicating that time affluence is positively related to subjective well-being, the present study does underline the necessity to consider time affluence as a crucial concept in psychological research. It also advocates the importance of time affluence as an element of well-being and quality of life as an important goal to attain, in both understanding it scientifically and putting it into practice.

## ACKNOWLEDGMENTS

This research was partially funded by the German Federal Ministry for Education and Research (Bundesministerium für Bildung und Forschung [BMBF]) under the FONA-program, SÖF-Project “ReZeitKon,” Award Number O1UT1708A.

## CONFLICT OF INTERESTS

The authors declare no conflicts of interest.

## ETHICS STATEMENT

The study was conducted in accordance with the ethical guidelines for online studies of the German Society for Online Research (DGOF, 2007). Ethical approval was not required as per local legislation. Informed consent was obtained in digital form on the first page of the survey from all individual participants included in the study, and anonymity of participants was guaranteed.



## DATA AVAILABILITY STATEMENT

The current article includes the complete raw dataset of the data described in the publication including the participants' dataset, syntax file, and log files for analysis, as well as the supporting information. All data are available in the Open Science Framework under <https://osf.io/e7c43/>.

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## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

**How to cite this article:** Schaupp, J., & Geiger, S. (2022). Mindfulness as a path to fostering time affluence and well-being. *Applied Psychology: Health and Well-Being*, *14*(1), 196–214. <https://doi.org/10.1111/aphw.12298>